notes of a low pitch, but the fine was mute. This was, so far as I know, the first time that the Studland sand had been musical *off the patch*.

According to my theory, if the number of grains with polished surfaces could be increased in this fine sand, the number of vibrations would increase also, and so intensify the note, and cause it to become audible; this could only be done, however, by introducing a certain percentage of grains fulfilling the required conditions. To obtain such grains and to introduce them gradually until the necessary number should have been added, would have been a tedious process; and it occurred to me then that the same result might be obtained if the sand were struck in a vessel with a hard and polished interior. I placed, therefore, this fine sand in a teacup, and on striking it, found that it emitted a high, shrill note (A in *altissimo*), which was far more intense than that given when it formed a part of the patch.

When polished grains of sand are in contact with the sides and bottom of a glazed porcelain vessel, it is obvious that there are numerous points of contact between two polished surfaces—the sand grains and the vessel—and that on striking the surface of the sand, the friction necessary to produce the vibrations of a musical note is induced between these points.

This I *proved* by placing the same sand in various vessels with rough interiors, and by lining these glazed or polished vessels with silk, &c., but in no case would this sand emit notes unless the grains were in direct contact with the glazed or polished surfaces. This peculiarity is not in any way dependent upon the sonorous properties of the vessel used, for it may be "deadened" with impunity, and the note will remain unaltered.

The results of numerous experiments show that musical sand of the Eigg type—*i.e.* sand possessing in great perfection the physical conditions necessary for the production of music—will be musical in receptacles of whatever composition or form, though in some of these it emits notes "under protest" only.[1]

Those sands which are of the Studland Bay type—*i.e.* having the necessary physical conditions less perfectly developed, and are usually mute except *in situ*—will emit music only in vessels possessing hard and glazed interiors, and, as a rule, of a certain form; while some of the more "sulky" types of sand not only need a vessel of hard and glazed interior, and definite form, but also require a box, or small pedestal of wood (which I call a "coaxer"), on which this vessel must stand before the notes emitted become audible. A "sulky" sand was rendered far more musical by being sifted, washed, and boiled, giving out, after this treatment, notes without the aid of the "coaxer."[2]

After discovering what could be done with such simple apparatus, it occurred to me to try, under similar conditions, some of my abandoned sands—those unmusical sands that had been, during a period of four or five years, treated unsuccessfully for music.

One sand (an iron-sand composed of more or less polished grains, quartz, and much dust formed of denser minerals) gave a very hopeful "swish" (explained in my paper of 1888) in a certain porcelain vessel, and from this—by (1) sifting in sieves, to eliminate the fine material, and to insure uniformity in size of grain; (2) rolling down an inclined plane of frosted glass, to separate the rounded grains from the angular quartz; and (3) boiling in dilute hydrochloric acid, to cleanse the surfaces—I succeeded in producing a sand that, in certain glazed vessels, emits musical notes as clear as those emitted from any of my musical sands but that of Eigg. This sand gives F in *altissimo*, but it very soon becomes "killed" because of the fine dust and loss of polish that is the inevitable result of the attrition of the grains. There remains but one thing to be done, and that is to produce a sand which, like that of Eigg, will be musical in almost any receptacle, and I have reason now to think that this will not be very difficult.

It has not been possible here to record more than the merest outline of what has been done, or to give instances of the interesting *capriciousness* of these sands; it should be understood, however, that no *ordinary* beach or cliff sand has the slightest inclination to "sing" under any of the "coaxing" methods at present known to me.

CECIL CARUS-WILSON.

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[1] When musical sands sound "under protest" they give out high, shrill notes. The smallest quantity of musical sand from which I can obtain a true note is a thimbleful of the Eigg sand. Small quantities emit notes of a high pitch.

[2] Many musical sands are quickly "killed" by constant striking, because the harder minerals present abrade the softer as they rub together, and this forms a fine dust.

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## NOTES.

SIR MICHAEL HICKS-BEACH, who previously gave a negative answer to the request made by the Executive Committee of the British Institute of Preventive Medicine, having reconsidered his decision, has now granted the required license to register the Institution as a Limited Liability Company, with the omission of the word "Limited." The license, however, is not to be construed as expressing approval by the President of the Board of Trade of experiments on animals, or in any way affecting the exercise by the Secretary of State of his discretionary powers to grant a vivisection license to the proposed Institute. The articles of association have been signed, and the Institute is now duly registered. The following gentlemen have already expressed their willingness to serve on the Council: Sir Joseph Lister, Chairman, Sir Charles A. Cameron, Mr. Watson Cheyne, Prof. Michael Foster, Prof. Greenfield, Prof. Victor Horsley, Sir William Roberts, Sir Henry Roscoe, Prof. Roy, Prof. Burdon-Sanderson, Dr. Pye-Smith. Dr. Armand Ruffer, of 19 Iddesleigh Mansions, Westminster, S.W., will act as honorary secretary until the first meeting of the Council.

THE graduation ceremony at the close of the summer session of the University of Edinburgh was held on Monday. Principal Sir William Muir, Vice-Chancellor, presided. Prof. Kirkpatrick presented for the honorary degree of Doctor of Laws Colonel Sir Colin Campbell Scott Moncrieff, K.C.M.G., C.S.I., R.E., remarking that, through his work as chief officer of the irrigation works of the Nile, it could be said that Sir Colin had created a greater and an infinitely freer, happier, and more prosperous Egypt than it was before. As a gallant officer, a distinguished man of science, a statesman of high merit, and, above all, as a benefactor of his fellow-creatures, Sir Colin was pre-eminently worthy of the highest of their academic honours. The honorary degree of Doctor of Law was then conferred *in absentiâ* on Prof. Simon Newcomb, Washington.

SIR JOSEPH FAYRER has been elected a Corresponding Member of the Royal Italian Society of Hygiene. Sir Joseph has also been promoted from the grade of Foreign Corresponding Member to that of Foreign Associate of the French Academy of Medicine.

PROF. DU BOIS-REYMOND, the distinguished physiologist of Berlin, has been awarded the Gold Medal for Science.

MR. J. E. KEELER has been elected Professor of Astrophysics in the Western University of Pennsylvania, and Director of the Allegheny Observatory. Mr. F. W. Very is associated with him as Adjunct Professor of Astronomy. It is expected that the Observatory will continue its researches on important problems in the domain of astro-physics.

IT is stated that Siam, following the example of Japan, is commencing to Europeanize her institutions. The founding of a University has been decided upon, and Prof. Haase, of Königsberg (Germany), has accepted the appointment to the Chair of Physics.

THE last number of the *Rendiconti* of the Reale Accademia dei Lincei contains an account of the annual meeting held on June 9, at which the King of Italy was present. After the opening speech of the President, Brioschi, one of the chief features was an admirable address by Prof. Messedaglia on the Homeric uranology, with special reference to precession.

*La Revue Scientifique* of the 1st instant contains the address by M. Villemin, the President of the Tuberculosis Congress. It deals with recent researches. The results of the first Congress are also detailed by M. Petit, the General Secretary.

A FINAL meeting of the Committee of the Virchow Testimonial Fund took place on July 16, Sir James Paget, Bart., F.R.S., in the chair. The Treasurer gave an account of the moneys received, which amounted to about £175. It was resolved to send this sum to the General Treasurer of the Fund, and to present Prof. Virchow on the occasion of his birthday with an illuminated address, conveying to him the congratulations of the Committee and subscribers. This the Honorary Secretaries, Dr. Semon and Mr. Horsley, were directed personally to transmit to Berlin on the occasion of the celebration.

THE Essex County Council has appointed an Organizing Joint Committee, consisting of six members of their own body and six members of the Essex Field Club, to form a centre for supplying lecturers and teachers (with apparatus and materials), conducting examinations, and affording help and guidance to local bodies, in connection with the recent grants towards technical instruction. A grant of £900 has been made for these purposes. The members of the Committee are: (representing the County Council) Mr. E. N. Buxton, Mr. E. A. Fitch, Mr. J. H. Burrows, Mr. S. W. Squier, Mr. F. West, and Mr. W. B. Whittingham; (for the Essex Field Club) Prof. Boulger, Mr. F. Chancellor, Prof. R. Meldola, F.R.S., Sir Henry E. Roscoe, M.P., F.R.S., Mr. F. W. Rudler, and Mr. J. C. Shenstone. The Organizing Secretary to the Committee is Mr. W. Cole, 35 New Broad Street, E.C.

THE idea of "a British Museum of Portraits," to be executed by photography, was conceived as long ago as 1864 by Mr. James Glaisher, F.R.S., and brought before a meeting of the Council of the Amateur Photographic Association, of which the Prince of Wales is the President. The suggestion was cordially approved by the meeting, and photographs were taken in *carte de visite* size and deposited at the South Kensington Museum. At first, however, only fading silver prints were made, and these were so unsatisfactory that for some years the undertaking was held in abeyance. By the discovery and perfection of the process of permanent carbon printing, an opportunity has at length been afforded of resuming the prosecution of the work under infinitely more favourable conditions; and, as a result, a collection of excellent portraits is now being made by the Amateur Photographic Association. Already there are nearly 200 large permanent carbon portraits deposited in the Art Department at the South Kensington Museum, and about as many more are ready to be sent. These latter were on exhibition at a private view on Saturday last at 58 Pall Mall, S.W., the studio of Mr. Arthur J. Melhuish (Photographer Royal). They embrace some photographs of men of distinction in science, and are excellent both as likenesses and as specimens of photographic art. The conditions under which they are taken are, in fact, sufficiently exacting to insure the production of a faithful portrait, inasmuch as every portrait must be approved by the sitter and by the Standing Committee previous to its being placed in the South Kensington Museum. The undertaking is on a non-commercial basis, the photographs being taken for the purposes of this collection only, and not for publication, and no expense of any kind being incurred by the sitter. The invitations to sitters are issued under the authority of the Council.

THE Trustees of the Indian Museum, Calcutta, have just issued the second and concluding portion of a Catalogue of the specimens of Mammals contained in that Institution. The first volume of the Catalogue, compiled by Dr. John Anderson, the late Superintendent, was published in 1881. The present volume, which commences with the Rodents, has been prepared by Mr. W. L. Sclater, the present Deputy-Superintendent. The total number of specimens of Mammals contained in the Indian Museum, as is shown in the Catalogue, is 4872. These are referred to 590 species, of which, 276 are found within the limits of the Indian Empire, and the remainder are from elsewhere. As the Indian Museum contains many types of Blyth, Jerdon, and the older Indian authorities, the collection is one of considerable importance, and the Catalogue will be of much use to students of the group of Mammals.

FOR the first time for many years the *Journal für Ornithologie* has actually appeared within the month imprinted on the cover bearing the date of publication. English ornithologists have this year received in July the Heft bearing the date 'Juli, 1891.' *Gott sei dank.* The articles published in the present year appear also to be of a higher class than many of those formerly issued in the *Journal*, and some very important papers by Dr. Reichenow, Dr. A. B. Meyer, Herren Schalow, Hartert, &c., have been published. The chief interest centres round the collections which that greatest of modern naturalist-explorers, Emin Pacha, has sent to Berlin; and the birds obtained by him during his journey from Bagamoyo to Lake Tanganyika are fully described by Dr. Reichenow. The novelties are not many, but are sufficient to show that there is much to be done in German East Africa before our knowledge of its ornithology approaches completion. English naturalists will await with eagerness the zoological work of our Consul in Mozambique, Mr. H. H. Johnston, C.B., for the whole of the district in his sphere of influence is practically unexplored as far as natural history is concerned, and at present our knowledge is almost a blank. To Mr. Johnston and his companions, therefore, English zoologists are now looking for information which shall connect the work of Böhm and Emin with that of Kirk and Livingstone.

IN a recent paper to the Société des Ingénieurs Civils, M. Haubtmann states that in London the cost of the electric "horse hour" is 0·375 francs, that is three times the cost of gas. In Paris it is 0·90 francs, and at Saint Brieuc, the town where, since June 1 last, it is cheapest in France, it is still 0·52 francs. At Fribourg it has the lowest cost in Europe, 0·15 francs, and 0·10 francs for a consumption over 20 horse-power. Such differences, he points out, do not arise from difference in cost of motor force, for, deducting that, the horse-hour still remains in Paris at 0·75 francs, while in Fribourg it is 0·125 francs. They arise from differences in the amounts of capital engaged, and in the systems adopted.

IT is stated that a memorial is about to be presented to the United States Congress asking for the creation of a Government Department of Public Health, with a Cabinet officer at its head, to be known as the Medical Secretary of Public Health.

THE Danish Academy of Sciences has recently offered the following among other prizes:—A gold medal, worth about £17, for an exposition of the theory of electric vibrations in limited and resting bodies in general, with a special application to simple forms of perfect conductors, so that for these cases, the mathematical problem may be explained, and if possible solved. A prize of about £22, for an investigation showing in the case of our four principal cereals, the nature, and as far as possible the proportional quantities, of the chief carbohydrates found at different stages of ripeness. Memoirs to be accompanied with preparations. A prize of about £27 for a complete account, accompanied with preparations, of the *Phytoptœcidia* found in Denmark, and a monographic exposition of the species of the genus *Phytoptus* (in its old and wider sense), which inhabit the various galls, found on a particular plant, with the view especially of showing whether several usually different galls of the same plant species arise from the same *Phytoptus* in different phases of its development. In choosing a plant, preference should be given for one in which these galls have an economic value, as is the case, *e.g.*, with some occurring on the beech. Further, the Academy desires an exposition, as complete as possible, of the development of a particular species of *Phytoptus*. The date for the first is October 31, 1892; for the two others October 31, 1893. Memoirs may be written in Danish, Swedish, English, German, French, or Latin.

The fürstlich Jablonowsky Gesellschaft, recognizing the fact that the determinations of the secular perturbations of the orbits of the interior planets, in the form in which they have been left by Le Verrier, are not satisfactory, and that probably the anomaly in the motion of the perihelion of Mercury is to be explained by the fact that the differential equations have been treated linearally, offers a prize of 1000 marks for a new determination of the secular perturbations of the orbits of Mercury, Venus, the Earth, and Mars, in which the terms of a higher order are taken into account. Competitors are to send in the results of their investigations before November 1894, observing the usual rules to secure the anonymity of their papers.

The *Educational Times* states that the Supreme Council of Hygiene of Austria has been engaged in discussing the advantages of erect as compared with slanting writing, and the official Report of Drs. von Reuss and Lorenz points strongly in favour of the former. They point out that the direction of the written characters has a marked influence on the position of the body. In "straight" writing the scholar faces his work, and is spared the twist of the body and neck, which is always observable in those who write slantwise, and one common cause of spinal curvature is thus obviated. The erect method is, therefore, expressly recommended for use in schools, in preference to the ordinary sloping lines.

We have received the eighteenth Annual Report of the Geological and Natural History Survey of Minnesota. It consists of a summary statement for 1889, report of field observations made in 188 and 1889, by N. H. Winchell; American opinion on the older rocks, by A. Winchell; additions to the library of the Survey since 1884, and a list of publications of the Survey.

*L'Électricité* points out that the new electric photophone, which consists of a small glow lamp at the end of an elastic tube used for throwing a strong light for surgical purposes into the mouth, ear, &c., was really suggested by the action of the water jet in the luminous fountains now so common, and that these really owe their origin to a laboratory experiment by M. Becquerel in 1876.

Herr Klenze, we learn from a German source, has been making inquiry into the digestibility of different kinds of cheese. The most easily digested, he found, were Cheshire and Roquefort; while others are ranked as follows, in ascending order of difficult digestion: Emmenthal, Gorgonzola, Neuchâtel, Ramadour, Rotenburg, Mainz, fromage de Brie, and (most indigestible of all) Swiss cheese.

In recent numbers of the *American Journal of Science* (February 1891) and *Ciel et Terre* (July 1 and 16, 1891) attention is drawn to the remarkable conclusions arrived at by Dr. Brückner in his work entitled "Klimaschwankungen"—the most complete work extant upon the question of the variation of climate—in which he shows that the climate has not undergone any continuous variation from the earliest historic time, but that it oscillates, and presents alternately periods of heat and cold, and of dryness and humidity, the period being about 35 years, which, it will be observed, is a multiple of the period of frequency of sun-spots (11 to 12 years). M. Penck, the eminent German geographer, has drawn some interesting conclusions as to the probable effects upon the harvests of the world.

Part 34 of Cassell's "New Popular Educator" has just been issued, and contains articles on applied mechanics, algebra, botany, electricity, and comparative anatomy.

Mr. G. C. Hoffmann, of the Geological and Natural History Survey of Canada, has made a microscopical and chemical examination of a peculiar form of metallic iron found on St. Joseph Island, Lake Huron. It appeared in the form of spherules disseminated through a thin deposit of dark reddish-brown limonite which coated certain faces of some surface specimens of quartz. These metallic-looking spherules were found to consist of nuclei of silicon coated with a humus-like substance, which in turn was overlain by a metallic layer containing all the elements most frequently met with in meteoric iron. But the small proportion of nickel present (0·11 per cent.), and the relatively large amount of phosphorus (1·07 per cent.), as also the fact that the spherules contain nuclei apparently of a concrete character, leads Mr. Hoffmann to suggest the possibility of a terrestrial source for the material, upon the assumption that it has resulted from the reduction of an iron-salt by organic matter. The paper, which is accompanied by four coloured plates, appears in the Transactions of the Royal Society of Canada, 1890.

The preliminary results of some investigations upon the growth of the face are stated by Prof. G. M. West in *Science* for July 3. The values obtained in the case of measurements of the female face point to the existence of three distinct periods of growth, the first ending at about the seventh year, and the third beginning at about the age of fifteen. The abrupt transition from one period to the next is indicated by the very slow growth of some children until the ages of eight or fourteen, when a rapid development often occurs. From the fifth to the tenth year the average growth appears to be about 6·5 mm. During the next four years it is 6·2 mm., and from this time little advance is made, the maximum of 128 mm. being reached at about the age of twenty. The male face is larger than the female face at all ages. Its growth is also more rapid, and continues later in life. The measurements have been on 2500 persons, including both sexes.

Prof. Tito Martini, of Venice, contributes to the issue of the *Rivista Scientifico-Industriale* for the end of June, the results of some experiments on the crystallization of thin liquid films. He finds that a strong solution of sodium sulphate, when cooled to near its saturation point, possesses a viscous character which enables it to form a thin film on a metallic ring, as in Mr. Boys's experiments with soap-bubbles. On rapid evaporation such a film crystallizes to an extremely beautiful open lattice-work of minute crystals, which preserve their transparency for some time, and then effloresce and crumble to powder. The experiments succeeded with rings up to thirty-six millimetres diameter. Similar experiments with ammonium chloride and sodium hyposulphite have hitherto proved unsuccessful. With a transparent film of liquid sulphur, however, even more beautiful results have been obtained. The author regards such experiments, besides being eminently suitable for lecture demonstration, as likely to throw light on the nature of molecular arrangement in relation to crystallization.

The same number of the *Rivista* summarizes a somewhat important communication to the Naples Royal Academy of Physical and Mathematical Sciences, in which Prof. Dino Padelletti urges that the usual investigation for the movement of the plane of oscillation of Foucault's pendulum in relation to the earth's rotation is insufficient. The author contends that the problem for latitudes between the pole and equator is more difficult than would appear from the usual simple solution, and cannot be solved by the principle of inertia. He proposes an equation derived from the principle of composition of the rotational forces.

A meteorological journal in the Russian language, the *Meteorologitscheskij Westnik* (Messenger), has lately appeared under the competent editorship of Woeikof, Rykatschew, and Spindler; its general plan seems to be like that of the German *Zeitschrift*. The idea of starting it arose at a meeting of the Russian Naturalists and Physicians at St. Petersburg in the end of 1889. Four graphic tables are given in this journal, showing the course of the meteorological elements during 1889 at the agricultural experimental station of Sapolje, also measurements of ground temperature, &c.

The *Selborne Society's Magazine* for July contains the first of a series of articles on the Kew Museums by Mr. J. R. Jackson; others on the effects of environment on plants, and other interesting matter. Among the correspondence are complaints from Warwickshire that the Wild Birds Preservation Act is a dead letter there, as the "authorities," whoever they may be, take no trouble in the matter. On the other hand, the inhabitants of Shetland are fully alive to it.

The last volume (xxii., 6) of the *Trudy* of the Society of Naturalists of Kazan contains the second part of Mr. Korzchinsky's valuable researches into the northern limits of the black-earth steppe region of East Russia. In the first part-published in 1888, the author gave the results of his explorations in the province of Kazan. He now confirms his conclusions by further exploration in Samara, Simbirsk, Perm, and Ufa. He gives the northern limits of the black-earth steppe vegetation, and shows that they depend neither upon climate nor upon the altitudes, but chiefly upon the courses of the rivers.

According to *La Nature*, the telephonic service of Paris, rapidly developing of late, will soon include an immense central telephonic office in the Rue Gutenberg, capable of serving directly 30,000 subscribers, without connection with the other offices of the quarter. The work is being actively pushed forward. Cables are being laid in the sewers, an enlargement of which, at certain points, is rendered necessary. There were 7800 subscribers in Paris last October. Paris has now telephonic communication with Brussels, Marseilles, Lyons (which also communicates with Marseilles), Lille, Havre, Rouen, and London. Twenty-eight towns in France have a telephonic system. There are two in Algeria, in Algiers and Oran. Lille and Roubaix, Lille and Dunkirk are connected by telephone; and, ere long, connection will be formed between Lille, Valenciennes, Calais, and Fourmies, between Lyons and Saint Etienne, between Dieppe and Rouen, between Marseilles and Nice.

The climate of the Greek island Cephalonia has been lately described by Dr. Partsch (*Petermann's Mitt.*). We note the following features. At Argostoli temperature reaches a maximum in July (25°·3 C.), whereas in Corfu and Patras it does so in August. With several days' calm and bright sunshine, in the bay, the air, laden with moisture, becomes unbearably hot and close. Yet the natives go but little to the wooded hills behind, where the temperature goes down sometimes to 15°·5 C. or lower. Mules bring down snow nightly, in summer, from covered pits in the hills, for supply of restaurants, &c. As to rain, there is a sharp contrast between the wet winter-half and the dry summer-half of the year. The annual rainfall (3½ years) was about 35 inches. The autumn rains are ushered in by severe thunderstorms. November and December are the wettest months, but about Christmas there is usually a short time of fine weather. March is extremely variable, and often very cold. With May begin the rainless months, and the drought is sometimes considerably over 100 days. Five months have sometimes passed with but a few slight showers. On this greatly depends the currant cultivation: a brief downpour may spoil the crop. Snow falls seldom in Argostoli, but often on the hills. Dew is plentiful in summer, but its salt precipitate is feared. Wind is greatest in winter, southerly winds prevailing, especially south-east. A hot south wind (the *lambaditta*) blows, rarely, in early summer, and with evil effects to vegetation. The fresh north-west wind (*maestro*) brings cumulus clouds on the hills.

Mr. F. Howard Collins, the author of a useful epitome of Mr. Herbert Spencer's system of philosophy, has written a pamphlet in which he discusses the causes of the diminution of the jaw in the civilized races. In opposition to the views of Weismann, he contends that the phenomenon is due to "disuse"; and the argument, as he presents it, deserves to be seriously considered. Some time ago Mr. Collins sent to Nature a letter in which he gave some account of the ideas which he now expounds more fully. In the preface to his pamphlet he seems to imply that the letter was not inserted because, according to a belief said to be current among certain biologists, the editor of Nature is "more willing to publish letters contending that acquired faculties are not inherited than those contending that they are." Mr. Collins has too readily allowed himself to be influenced by the belief of "certain biologists." If he supposes that it is possible for the editor of Nature to print all the letters sent to the paper for publication, he must have a very inadequate conception of an editor's functions.

To throw light on some physiological processes, Herr Hofmeister recently experimented (*Archiv für experim. Pathol.*) on the swelling of plates of gelatine in various solutions; the plates being taken out from time to time, dried, and weighed. With salt solutions of various concentration, the gain of weight was large in the first days, then gradually fell off, as in former experiments with pure water. The effect varied with the nature of the salt; and even with solutions holding the same number of molecules in 1000 parts water, the swelling varied as much as five-fold. This difference, it is pointed out, is related to attraction of the salt for water; the greater the attraction, the more difficult the entrance of water into the plate. But that this is not the only factor is proved by the swelling in pure water being always much less than that in the solutions. Experimenting with ordinary salt, the gain of weight proved to consist both of water and salt, both dependent (but differently) on concentration. With increase of the latter, the gain of water rises to a maximum (about 13 per cent.), then declines; but the gain of salt goes on always increasing proportionally to the concentration. The remarkable property salts have of increasing the gain of water beyond what occurs in pure water is also shown by indifferent organic substances, as cane-sugar and alcohol. Experiments were further made on swelling of gelatine plates in methyl-violet solutions, and with the result that the concentration of the solution in the plates was always much greater (over 30 times) than that in the solution presented. The colouring-matter is taken up in relatively much greater quantity than the water. Further, gelatine takes up somewhat more colouring-matter relatively from a dilute than from a concentrated solution. The forces concerned in these phenomena, and which are neither purely mechanical nor chemical, Herr Hofmeister brings into analogy with those occurring in absorption of gases by liquids, the reciprocal solution of liquids, adsorption of gases on solid bodies, &c.

THE *Photographic News* quotes the following from the *Scientific American*, December 9, 1848:—"*New Electrical Light.*—The inventors of a new electrical light, exhibited at the Western Literary Institution, Leicester Square, London, on its recent reopening under the new auspices, expect, it is said, to apply it generally to shop and street illumination, and they state that, while the conveying will cost no more than gas, the expense of illumination will be one-twelfth the price of the latter light. The current of electricity, in passing through the two pieces of charcoal which form the poles of the circuit, and are excluded from all access of air, gives, in this case, it is said, an intense and beautiful white light, with the effect of daylight, to a much greater extent than the lime does, and having this advantage, that it is sustained and continuous. If Messrs. Staite and Petrie can thus produce a steady and sustained light they have accomplished what has hitherto been the sole preventive to the substitution of galvanism for gas. The *Mechanics' Magazine* states that this one light completely eclipsed ten gas lights and an oxyhydrogen. The gas companies had better look out. The dissatisfaction of the public with their mismanagement may have begotten a rival destined to eclipse many more than merely ten of their gas lights."

WITH the view of certifying to the efficiency of teachers of public elementary schools to give instruction in woodwork in accordance with the provisions of the Code (1890), the City and Guilds of London Institute is prepared to issue certificates to qualified teachers of public elementary schools on the following conditions:—The candidates will be required to give evidence of having regularly attended during each of two sessions, a course of at least twenty practical wood-working lessons in a school or class certified by, and under an instructor approved by, the Institute. The candidates will further be required to pass an examination at the end of each year's course, to be conducted by examiners appointed by the Institute, and to pay a fee of five shillings for each examination. For the first year, candidates who have attended an advanced course of instruction will be exceptionally admitted to the second year's examination without having passed the first, and will be eligible for the teacher's certificate. The examination fee for such candidates will be ten shillings. The written examination will include questions founded on such subjects as the following:—*Woods.*—Places from which some of the commoner woods are obtained. Their characteristic properties and uses. The general structure of cone-bearing and leafy timber trees. The meaning of seasoning timber. Effects of shrinkage and warping. Identification of specimens of wood. The questions will be limited to oak, ash, elm, beech, mahogany, sycamore, basswood, white deal (spruce), red pine (Scotch fir), yellow pine.

*Das Wetter* for July reports a curious case of globular lightning which occurred at Berga, near Schlieben, in Germany, between 3 and 4 o'clock on the morning of July 1. The lightning entered the chimney and split into two parts, one portion ran along the rafters of the roof, and the other entered a bed-room occupied by a man with his wife and three children. The man, who was up, on account of the violence of the storm, saw the ball jump on to the bedstead, which it broke, and from there it slowly travelled to the opposite side of the room, and disappeared, with a loud crash, through the wall. None of the occupants were injured, further than being deafened for a short time.

THE additions to the Zoological Society's Gardens during the past week include a Banded Ichneumon (*Herpestes fasciatus*) from West Africa, presented by Dr. Arthur Williams; a Black Stork (*Ciconia nigra*), European, presented by Lord Lilford, F.Z.S.; two Nilotic Crocodiles (*Crocodilus vulgaris*) from Africa, presented by Dr. Lester; two Black Storks (*Ciconia nigra*), European, two King Parrakeets (*Aprosmictus scapulatus*) from New South Wales, purchased; a Laughing Kingfisher (*Dacelo gigantea*) from Australia, deposited.

## OUR ASTRONOMICAL COLUMN.

RESEARCHES ON THE MEAN DENSITY OF THE EARTH.—The *Monthly Notices of the Royal Astronomical Society* for June contain a brief account by Prof. A. Cornu of the experiments M. Baille and himself have been making for some years to determine the mean density of the earth. The apparatus employed is fundamentally the same as that used by Cavendish. It consists of a horizontal aluminium rod, suspended by a torsion thread 4 metres long, carrying at each end a ball of copper, bismuth, iron, or platinum, and at its centre a vertical mirror reflecting the divisions on a millimetre-scale 5 metres away. Two globes of mercury are used to produce the torsion couple. The displacements of the scale-divisions are observed with a telescope, and indicate the angular displacements of the rod. The chief improvements which have been made upon the apparatus used by Cavendish, Baily, and Reich, are as follows:—(1) The length of rod connecting the suspended balls has been reduced to 0·50 metre, *i.e.* to a quarter the length adopted by the above-named observers. (2) The attracting masses have been reduced to 10 kilogrammes. Cavendish used masses weighing more than 140 pounds. And the method of using fixed globes which can be quickly filled with mercury has been advantageously substituted for the movable lead weights. (3) The complete oscillation of the balance arm is registered on a chronograph by observing and recording the transits of the reflected scale divisions. (4) The use of an annealed glass fibre to eliminate errors due to displacements of the zero point. (5) The screening from variations of electric potential by putting all parts of the apparatus in metallic connection with the earth. (6) The copper case protecting the balance arm is a good conductor of heat, and of sufficient thickness to eliminate the disturbances due to variations in temperature. The authors hope soon to obtain an estimation of the probable error of their measures, and to arrive at a definite result for the constant they are determining.

PARALLAX OF P URSÆ MAJORIS.—Vol. xxxviii. of the "Astronomical Observations of the University Observatory of Königsberg" contains the heliometer observations of P Ursæ Majoris (Arg.-Oeltzen 11677) made by Dr. Julius Franz, from which he deduces the parallax 0″·1002 ± 0″·0065, or approximately 0″·10 ± 0″·01.

## THE PROGRESS OF MEDICINE.

THE Bournemouth meeting of the British Medical Association has been a great success, and a great deal of useful work and discussion has been recorded. Among the addresses we may refer to the President's (Dr. J. R. Thomson), on the present position of medical officers of health; of Dr. Lauder Brunton, on twenty-five years of medical progress; of Dr. J. Chiene, on rest as a therapeutic agent in surgery; and others on lunacy legislation, the uses and prospects of pathology, &c.

We make the following extracts from Dr. Brunton's address, which presents us with a most admirable and masterly analysis of recent progress:—

. . . Perhaps there is no period in the whole history of medicine in which such rapid changes have taken place as in the last five-and-twenty years. It is impossible to give anything like a complete account of these in the brief space of one hour, and I shall therefore restrict myself to a few of the more prominent points, and especially those that have come directly under my personal cognizance; for, like the man who made one-half of his fortune by attending to his own affairs and the other half by leaving other people's alone, I may probably utilize the time at my disposal best by speaking of what I know myself and leaving other things out.

*Advances in Knowledge and Teaching due to Experimental Method.*—These changes have occurred both in the profession